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Dear Friends:

Many thanks to those that sent funding to keep the Keyletter in print. Please check your mailing label - if the number after your name is 30 or less you need to make a contribution to keep your subscription active.

Most of this issue will be taken up with excerpts from a 1929 Western Union plant catalog. Richard Loveland has been kind enough to transcribe major portions of the 180 page original. This has been a major effort , and both of us have spend many evenings editing and formatting the text. We have made only slight changes, and only in cases where it was necessary for clarity.

As soon as I print this issue of the Keyletter I plan to put the excerpts from the plant catalog on my web page with hyperlinks to photos of as many of the items described as I can locate. Please take a look at your collection - photos would be appreciated!

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THE WESTERN UNION TELEGRAPH COMPANY INSIDE PLANT CATALOG OF APPARATUS, MATERIAL and TOOLS

July 1, 1929

[Transcription courtesy of Richard S. Loveland, N3IA]

ARM, RESONATOR EXTENSION. A metal arm for converting type 3-A to type 7-A resonator; so constructed that it can be placed between the arms of a 3-A resonator to lengthen it. L-10", Ht (over all)--2-3/4", W--1-1/4"

BASE, KOB, 1-B.* (See also wood base below) Used for mounting key and main line sounder to make KOB set. Intended for permanent use. Piece of 3/8" ebony asbestos with two cross cleats of Bakelite to act as feet. Drilled for 2--#6-32 x 1-1/8" R.H.I.M.S. for sounder, 3--#6-32 x 3/4" F.H.I.M.S. for key and 2--#8 x 1" R.H.I.W.S. for fastening to shelf, screw and nuts being furnished with base. L--8-3/4", W--4-11/16", Ht--5/8"

*1-A base was piece of asbestos without cleats, wood screws being used to fasten instruments.

BASE, KOB, WOOD. Used for KOB service when sets are to be disassembled within a short time. Piece of 3/8" wood same size as 1-B base. Screws to be ordered separately as follows: 2--#8 x 7/8" R.H.I. wood for sounder, 3--#6-32 x ½" F.H. Br. wood for key, and 2--#8 x 3/4" R.H.I. wood to fasten base down (if needed).

BATTERY, DRY. See Cell, Dry.

BATTERY, GRAVITY. For use where it is impractical to establish power plants or use main line sounders. See also Caustic Soda Battery. A 6" (dia) x 8" glass jar with zinc electrode (crowfoot zinc) hung near the top, and copper electrode (battery copper) in bottom surrounded by blue vitriol (copper sulphate or "bluestone"). The cell action forms zinc and copper sulfate solutions which remain practically separate because the latter is much heavier, hence the term "Gravity" battery. Battery oil is used to prevent evaporation. Open circuit voltage 1.07 volts. Internal resistance 2 to 4 ohms. Capacity 200 A. H. per lb. of zinc, 87 A. H. per lb. of blue vitriol. Maximum continuous current: 150 mils for main line service; 250 mils for local line service. An average main line cell will use per year: 8 lbs. vitriol, 2 zincs, 1 copper. An average local line cell will use per year; 10 lbs. vitriol, 2-1/2 zincs, 1 copper. List of parts: Jar, Gravity Battery; Vitriol, Blue; Copper; Battery; Oil; Battery Zinc, Crowfoot.

BLUESTONE. See Vitriol, blue.

BLOCK, CONNECTING, 7-B. Used as a connecting point between flexible wires of arm resonators; registers and the wiring of the associated equipment; also on various telegraph sets. See also 73-A. Composition base with three pairs of screw posts for three individual circuits. Has hinged metal cover to protect screw posts. L--2 1/8", W--1". Ht--7/8".

BOLT, SOUNDER, 3-A. Used to fasten sounder to resonator hood. A #8 32" x 1-1/2" R.H.I. machine screw with thumb nut and washer, all nickeled.

BOX, JACK, 1-A. Used only for maintenance of bridge testing sets already so equipped. Switch controlled sets (Spec. 1937-A) do not require. Wooden box, hard rubber front, holding 5 jacks WE 156 and 2 resistances, wired to external binding posts. Plug and cord included. W--8-3/4", D--7", ht--3-1/2".

BOX, CALL, 6-B.* Used on messenger call circuits to send coded signal. A clockwork mechanism mounted on an oval porcelain base, enclosed by metal cover through which operating handle projects. Rotation of handle winds up mechanism so will open and close call circuit through code wheel and contacts when handle is released. Binding posts are concealed by cover but have exposed lugs to afford quick testing. Code wheels must be ordered separately. L--5-7/8", W--3-5/8", Ht (over handle)--3".

> * Type 4-B (Specn. E-63) is much similar (but has exposed binding posts) and is used interchangeably. Type 6-A is much the same as 6-B but does not have test lugs. Type 5-A (Specn. 577) now obsolete, was designed to fit standard single gang flush wall switch box.

BRACE, KEY, 1-A. Used on Morse operating positions to prevent sending machine ("bug") from sliding into Morse key. Piece of #18 ga. brass angle 3-1/2" long, base ½", upright leg 5/8".

CELL, DRY. Used for open circuit work on telephone and telegraph circuits. Standard #6 dry cell with Fahnestock clips. Max voltage 1.5. Dia. 1-1/2", H--6"

CHAIR, MORSE 1-D.* Used by Morse and automatic (except simplex) operators, also by others who do not require standard wood office chair. Steel framework with composition seat and back rest. Back feet are of swivel type to prevent damage to floor if chair is tipped back. Seat--17" front, 16" depth; Ht of seat--approx. 18"; Ht (overall)--32-1/2".

> *There are a number of older types of chairs in use and care must be exercised when ordering repair parts to see that they are of the proper type. See Specn. 1818-B on repairs. Other types of chairs were furnished with solid feet. These should be changed to swivel (back feet only) whenever composition floor is laid or when other maintenance work is being done.

CLOCK, COUNTER, 2-A.* For use in small offices where a large clock is unnecessary or undesirable. Flat watch case type of clock, case 1" x 1 ½" set on a small bracket for wall or shelf mounting. 8-day rim wind, rim set.

> * Older type has 2" deep nickel plated round case. No code number was assigned.

CLOCK, KEYWIND, 3-A.* Used in offices which have no time service connections. Commercial type 8-day pendulum clock,12" dial. Arabic numerals octagonal case about dial. Ht--32", W--18".

* Type 2-B had round case about dial. Older types which had no code number had Roman numerals.

CLOCK, SELF WINDING. [Order on Form 1810-A] Used in Western Union and subscribers offices where time service connections are available. See standard time service pamphlets for various types. Special 1-C clock, with or without synchronizing electromagnet, is used to operate dry cell 10 volt time stamps in offices where power operated stamps cannot be provided as outlined in Spec. 194-G. This clock has time stamp contacts for direct connection of stamp and has space in case for batteries. Case is rectangular--28" x 18" x 8". Standard clocks can be equipped with time stamp contacts (closed 1 sec. per minute on the half minute), battery control contacts (closed 5 secs. before and after the hour and motor generator control (closed 20 secs. before and 10 secs. after the hour). Special time stamp contacts which close every ten seconds can also be secured. Clocks may be ordered equipped with contacts, or if a clock is available the movement can be ordered to have contacts added.

COPPER, BATTERY. Used for lower element in gravity batteries. Three 2" x 6" leaves of #32 ga. copper riveted together at a central point and a 15" stem of #14 ga. insulated copper wire attached to one leaf. Leaves are laid flat together for shipment but are opened up like spokes of a wheel when used.

CORD, RESONATOR. (Pieces or feet) Used with arm resonators to connect up sounder. Standard twisted pair lamp cord. If desired for resonators, order by pieces in which case lengths five feet long with ends whipped and soldered will be furnished. Order by feet for other special use.

CORD, ... FT. LONG, WITH PLUGS.* Used for testing and patching on double conductor switchboards. Tinsel copper conductors each covered with a floss and braid, and the whole covered with an outer colored braid, max. dia. about 5/16". Cords 511-B and 536-B are single and double conductor test cords respec. Cords 525-A and 526-A are double conductor patch cords, the first having plugs wired tip to tip and sleeve to sleeve, and the second having the connections reversed. Cord 527-A has three ends and made in a "Y" shape with all plugs in series. Length is clear distance between plugs.

Code No.	Length	Number	Plugs	Outer Color	Specn.
511-B‡	6'	1	1-C	White	2503-A
525-A	4",1',2',3',5'	2	3-B	Green	1302-A
526-A	4",1',3',5'	2	3-B	Red	1303-A
527-A	1', 3'	3	3-B	Green	1304-A
536-B	2'. 4'. 6"+	1	3-B	Green	2504-A

* Cords of W.E. manufacture with same code number were formerly furnished.
‡ Spade tips of cords WE 511 will not fit screws on 7-B connecting blocks.
+ Semi special--do not order unless called for in specns.

CORD, ATTACHMENT, 1-A.* Used to tie single conductor idler plugs to jack boxes. Piece of gray cotton sleeving 12" long.

*Dummy plug attachment 1-A was formerly used.

CORD, DOUBLE CONDUCTOR [Test and Patching] See cords 525, 526, 527 and 536.

CORD, LAMP, TWISTED PAIR, ... GA., NEC. Used in some lighting fixtures and for misc. test purposes. Standard twisted pair cord, available in sizes #8 to #18 incl.

CORD, PRINTER, BLACK. [Form 2968] Used to connect up line side of simplex printer on 32 type table. Piece of #18 ga. reinforced type P-1/64 lamp cord with one end equipped with a 3-B plug. Outer color is black to differentiate it from transmitter cord which is red.

CORD, RESONATOR. (Pieces or feet) Used with arm resonators to connect up sounder. Standard twisted pair lamp cord. If desired for resonators, order by pieces in which case lengths five feet long with ends whipped and soldered will be furnished. Order by feet for other special use.

CORD, SENDING MACHINE. Used on semi-automatic sending machines ("bugs") Double conductor cord about 24" long and 1/4" dia. with cord tips at one end and special wedge plug at other to fit under circuit closing lip of Morse key.

CORD, SINGLE CONDUCTOR. [For swbd, test sets] See Cord 511-A.

CORD, SINGLE CONDUCTOR, 5-B. .... FT. LONG, WITH PLUGS. Used in making patches on single conductor switchboards. Stranded copper wire (equivalent to #14 ga.) covered with rubber to overall dia. of 1/4". A plug #1 type is attached to each end. Furnished in 1', 2', 3', 4', and 6' lengths. (Clear distance between plug shells.)

* 5-A cord, Specn. 768-A, was designed for same service but had outer black braid.

CORD, SWITCH, ... CONDUCTOR, WITH WEDGE. Used as test cord on spring jack switchboards, also on old style table jacks for master sets. Copper tinsel conductor, either SINGLE or DOUBLE, rubber and cotton insulated and laid into a round conductor with an outer black braid. (Older purchases have had blue or green braid.) One end has flat wedge plug and other has a piece of #14 ga. wire soldered to end of conductor. Furnished in 6' length only.

CORD, TRANSMITTER, RED. Used to connect up transmitter side of simplex printer on 32 type table. Piece of #18 ga. reinforced lamp cord Type P-1/64, with one end equipped with one end equipped with a 3-B plug. Outer color is red to distinguish it from printer cord which is black.

DIAPHRAGM, MORSE RELAY. Used on Morse observation sets to transmit relay armature vibrations to dictating machine. A round sounding diaphragm with a mounting projection which is fastened under relay thumb nuts and a fork which engages tip of armature. Dia. about 3".

GALVANOMETER, 1-A.* Used with bridge testing sets. Wood or composition case containing highly sensitive coil and pointer of D'Arsonval galvanometer type. Has shunts to hold down current to coil until circuit is well balanced. L--6 ½", W--4 ½", Ht--2 3/4".

*Several models have been used, all of which are known by the same name and can be used interchangeably.

HOOD, RESONATOR. Used as a sounding board for sounders in connection with various resonator supports (See resonator). A wooden hood, horizontal base on which sounder sets, and top sloping over sounder making ends equilateral triangle. W--6 7/8", Ht--7 1/4", D--5".

JACK, LOOP, WEATHERPROOF, 1-A. Used for terminating loops at ball parks, etc. where standard switchboards could not be used because of exposure to weather. Cast aluminum box, with two 200-A jacks set in one end and a condenser 21-AA and 2 Fahnestock clips inside. Wires lead in through a box connector at rear. Condenser normally closes loop but is lifted when plugs are inserted in jack. L-9 1/2m /w--3", Ht--3 ½".

JACK, TABLE, ...WIRE. Superseded by cordless table jacks. Wood base with four to twelve spring clips made to take wedge of old style switchboard.

JAR, BATTERY, 1-A. Round glass specn. E-50-B. 6" x 8" high. Used on various types of batteries and chemical rectifiers.

KEY, CABLE. Used in ocean cable service for manual transmission. Two keys, on the set side by side on a base 4" x 4 ½", Ht--1 ½".

KEY, LEGLESS, 2A. Used for hand sending on Morse telegraph wires. Oral [sic] brass skeleton base with nickel plated steel sending lever mounted in two trunnion posts. Circuit closing lever is mounted alongside sending lever, both having hard rubber buttons. Base 3" x 2" x 1" high. Overall 5" x 2 3/4 x 1 ½ high.

KEY, POLECHANGER. Used for hand sending on automatic terminal sets and repeater on automatic circuits. Essentially a Morse key, but parts are mounted on a moulded base and circuit closing lever is replaced by a separate switch. Type 1-A also had brass base similar to a Morse key, but did not have open contact on switch.

Type	Where used	Switch	Base	L	W	Ht
1-B*	Multiplex and Universal Rptr.	3 point	5" x 3 ½"	6"	3 ½"	1 3/4"
3-A	Overland Recorder ccts	9 point	5" x 4 ½"	6"	4 ½"	1 3/4"
4-A+	Overland Recorder ccts	6 point	Same as 3-A			

* Type 1-AB will also be furnished. This is a 1-A key with switch converted to be like that of 1-B key.
+ 4-AB is a 3-A converted to be electrically equivalent to a 4-A.

KEY, OPEN CIRCUIT. For use on telegraph wires operated on the "open circuit" principle. General construction similar to leg key 2-A, except that circuit closing switch, when closed, engages two separate contact lips, and when open engages a third lip. When the circuit switch is closed, the battery stands "open", and cannot be closed by pressing on the key lever until the switch is thrown. L--5 ½", W--3 1/4", Ht--1 1/4", Wt--1 lb.

KEY, STRAP, 3 PT., 3-B. Used with switchboard voltmeter to secure static line "kick. Flat spring lever set on a slate base. Upper contact on lever normally touches contact on brass arch mounted over the lever. Depressing lever closes contact below. L--4". W--2". Ht--2".

METER, CONTACT ADJUSTING, 1-A, FOR SEMI-AUTOMATIC KEY. Used to test the adjustment of the contacts on semi-automatic sending keys ("bugs"). Cast brass hollow base with various resistances set inside, and Weston Model 501 DC millammeter with special zero center scale. Has wedge jack on side for wedge of key and has lamp cord lead for connection to battery. L--9", W--5 ½", Ht--5".

METER, FREQUENCY 1-A FOR SEMI-AUTOMATIC KEY. Used to measure the transmitting dot speed of semi-automatic keys ("bugs"). A cast brass case in which are mounted two magnets, necessary resistances and condensers, and a dial and pointer on the face. One magnet is connect to a clock which will hold magnet circuit closed for two seconds. Key is set on top of case so magnet armature will vibrate it. Wedge of key is put in wedge jack so as to send dots to stepper magnet which operates pointer over dial. L--11", W--10", Ht--6" (Magnet armature extends 6" above top).

OIL, BATTERY. Heavy mineral oil used on gravity batteries to stop evaporation. 1, 2, & 5 gal.

PLUG, DUMMY, WE 165. Used for holding circuit open in pin jack boards. Wooden plug, 2" long, with shank formed like single conductor plug.

PLUG, SPLIT, 2-A. Used in peg switchboards to loop in a portable Morse set. Tapered brass rod separated into equal halves by insulation with screw terminals and hollow fiber handle. 3" long by 3/4" wide.

PLUG, TWIN, 1-A. Used to connect portable Morse or other sets to Weatherproof Loop Jack 1-A. Two double conductor plugs (with special shells) set in a brass shell shaped like a flattened tube. L--3 3/4", W--1 ½", T--3/4".

POLECHANGER, GRAVITY BATTERY. [Refer all needs to Vice Pres. Plant] Used on duplex or quadruplex sets operated with gravity main battery. A Morse sounder with armature extended in opposite direction from anvil to move a contact set between two small contact levers. Form a "continuity" type polechanger (short circuits battery momentarily). L--9 1/4", W--4 3/4, Ht--4 1/8".

POLECHANGER, TRANSMITTER. See Transmitter

RECORDER, SIPHON .... DISTANCE. Used as a recording instrument in ocean cable service. A group of permanent and electromagnets which operate a siphon tube set on a sensitive suspension. Motor in base feeds paper from reel in base. SHORT distance type suitable for cables up to 500 miles in length. LONG distance type is more sensitive because of larger coils and stronger fields. Approximate size 15" x 15" x 18" high.

REGISTER, DOUBLE PEN, ... (Give resistance for 1-C type). Used on messenger call circuits to register calls. A clock work mechanism which is started by movement of the armature of an electromagnet connected into the register leg of the call circuit. Starting of the mechanism draws paper tape through between a thin roller and a "pen" which throws tape against roller when armature operates. Edge of roller is inked by an ink wheel and makes mark on tape each time pen operates. Has two pens and two electromagnets, thus caring for two circuits. Clockwork is in metal case with subbase, coils and pens being on outside. Tape is carried on a bracket arm.

Type	Resistance	Current	Where used
1-C	6	250	26 and 52 volt old style board.
1-C	400	50	All voltages, #2 type units.
3-A	*3000	30	With #3 type units.

* Resistance of coils is 1000 ohms, balance being added resistance mounted under base. Supersedes 2-A 1900 ohm register, which had 400 ohm coils with 1500 ohms added. L--10 ½", W--7 1/4", Ht--6".

RELAY, BOX. Formerly used where main line sounders are now used. Ordinary Morse relay with all or part of coils surrounded by wood box to increase volume of sound. Had key on base giving rise to "K O B" designation for portable set.

RELAY, LOCKING, 2-A, ... OHM. Used as a line relay on front locking shunt contact repeaters. Generally similar to a Morse relay but armature is taller in order to enter field of a single coil locking magnet mounted above the main line magnets. Has slate base mounted on iron subbase. Resistance of holding coil must be specified. This is 12 ohms for primary battery locals and 80 ohms for all other voltages. Main line coil--150 ohms 40 mils; holding coil 12 ohms 250 mils or 80 ohms 110 mils. L--8 1/4"; W--4 3/4"; Ht--4 ½".

RELAY, LOCKING, 3-A. [Will be furnished interchangeably with 2-A type] A neutral relay 7-C rewound to operate in the same circuits as locking relay 2-A. Currents required are identical. Main line coil--270 ohms; holding coil--5 and 45 ohms respec. (The holding coil has two spools instead of one as on the 2-A relay.)

RELAY, MORSE, ..., ... OHM. For general use in single Morse operation. Common telegraph relay with pair of adjustable magnets, armature, "goose-neck" contact carrier, all mounted on a wood base. Type 4-B, the oldest model is mechanically larger than the later 4-C and 4-D, and has a higher resistance for a given operating current. The 4-B type was originally made in 35 and 150 ohm resistance, but 150 ohm only is now furnished, the other being superseded by 4-C 25 ohms. The 4-B type must be used wherever space and resistance will permit.

Type	Resistance	Normal Current	L	W	Ht
4-B	150	40	8 1/8"	4 3/4"	3 ½"
4-D*	25	60	7 3/16"	3 7/8"	3 3/4"
	100	40	same		

*4-C is practically identical and interchangeable.

RELAY, NEUTRAL, 7-C. Used on circuits such as quadruplex, central battery duplex, etc., which require a differential non-polar relay. Also used on simplex telephone circuits per Specn. 559. Two pairs of electromagnets, the larger, or main line pair being set side by side, and the upper or holding, pair set one above the other. The line coils are each wound differential, while the holding coils are single wound. A single armature is mounted in the field of both main line and holding coils. Slate base with iron subbase. Resistance--each line circuit approx 250 ohms; holding coil 2000 ohms. L--8 1/4", W--4 7/8", Ht--5 ½".

* Older relays types 7-A and 7-B had a holding coil of only 230 ohms.

RELAY, POLAR, 6-C. Used as line relay on key worked duplex sets and as leak relay on various repeater circuits. Two J-shaped permanent magnets with a coil on each short leg. Each coil has two 200 ohm windings wound differential. Tubular steel armature vibrates between pole pieces. Contact carrier is set on slide blocks which can be moved by thumb screw. Has slate or fibre base set on iron subbase. L--8 1/4", W--4 3/4", Ht--2 3/4".

*Two other types of relay, the Frier and the 16-A will be furnished interchangeably as available in stock. The Frier type can be identified by the fact that coils are encased in a brass case, while the 16-A type has a single L-shaped permanent magnet.

RELAY, POLAR, 17-B.* (See also Relay, Wheatstone) Used on printer and other high speed circuits where relay of the 6-C type is not of sufficient speed. A U-shaped magnet with one leg bent upwards to a horizontal position to form mounting for a pair of coils set side by side with armature between them. Each coil has three windings, two main line which are differential--and a third for local circuit. Contacts are set on sliding block. Relay is fastened to a relay mounting 2-A for quick attachment to relay subbase 2-A (ordered separately), and has a cylindrical cover with hinged top in which is set a magnifying glass for viewing the contacts without opening the top. Dia--5 1/8", Ht--5 3/8".

* A few 17-A relays built on the same general principles are also in service.

RELAY, PONY. Obsolescent, formerly used on time service. Similar to Morse relay but of smaller dimensions. Resistance 20 ohms, current 130 mils.

RELAY, SINGLE-CURRENT, 10-A. Used on duplex or other sets carrying signals at speeds higher that those normally used in Morse circuits. A relay mounting 2-A in which is set a single coil relay. Coil is of form wound type and sets vertically with armature passing through it horizontally. A C-shaped laminated yoke sets at one side of coil on a moveable plate which allows adjustment of air gap between yoke armature by means of a knob and eccentric. Tension of armature retractile spring is adjusted by a similar knob through a cam and lever. Mechanism is covered by a rectangular steel case through top of which adjusting knobs protrude. Resistance 125 ohms; normal operating current-- [No value shown] Dia--5 ½", Ht--4".

RELAY, TELEGRAPH, 26-A. Used on telephone selector message circuits to reverse polarity of line signaling battery. Much like Morse relay 4-D but has two armatures each with front and back contact. Resistance 25 ohms, current 300 to 400 mils.

RELAY, TRANSMITTING, #28 and #29 Types. Morse relays with an extra pair of contacts added in order to make them equivalent to transmitting relays for front contact shunt locking repeaters. Type 28 was constructed from a spectacle type Morse relay, the extra contacts being above the regular ones. Type #29 was constructed from Morse relays 4-C by interposing the extra contacts between the armature and contact, the extra contacts being mounted on a bracket at the side of the relay.

RELAY, TRANSMITTING, ... OHM. Used on single line repeaters of the front locking shunt contact type. A relay either of the Morse 4-C or 4-D type, or of similar design, with an extra pair of contacts added in order to close two circuits when the relay is energized. One pair closes before the other and this pair is the last to open. Two types are furnished interchangeably, WE 24 or #30 (W. U. Specn.). Each made in two resistance values, 25 ohm or 400 ohm. #24 type is coded 24-C for 25 ohm, and 24-D for 400 ohm, while coding of the #30 is the same for either resistance. Type 30-A (Specn. 1369-A) is made by converting a Morse relay, while type 30-B (Specn. 1888-A) is a direct manufacture. All of these relays have lugs for connection of coils in series or parallel. L--7 3/8", W--3 7/8", Ht--5 3/4"

	Resistance		**Current**	
Type	Series	Parallel	Series	Parallel
25 ohm	25	6.25	110	250
400 ohm	400	100	30	60

RELAY, WEINY PHILLIPS. Used as a line and locking relay in Weiny Phillips repeaters, which are obsolescent. Similar in design to a locking relay 2-A, but locking coil has a tap at middle point, making two 40 ohm coils. Locking coil is demagnetized by operating these coils differentially instead of by shunting the current out of them as is done in the front contact shunt locking repeater. For other data see Relay, Locking, 2-A.

RELAY, WHEATSTONE, ... Used interchangeably with polar relay 17-B for operation of polar high speed telegraphic circuits. A U-shaped armature set on its side with horizontal legs bent back into a half circle within which two vertical spools are set. Each spool has from three to five windings for main and artificial lines, and local circuits. Armature consists of thin vertical spindle with field pieces at top and bottom and tongue at top. Base of relay is a relay mounting 2-A, on which is set a cylindrical composition dust cover with hinged glass cover to give access to armature and points. Dia--5 ½", Ht--5 1/4".

Type	Usage	Number of windings per spool
COMB. 1-A, 1-B* 1-C, 1-D, 1-F	General Use	4--main, artificial, accelerating and opposing.
GND CORRECTOR.	Relay Ground Correction	3-main, 2 auxiliary, (one on each spool)

3-A		
4-A	Superposed Universal Repeaters	5- 2 main, 1 artificial, accelerating and opposing

*An older type 1-B (without with out the word "Combination") had only the main and artificial windings. Relay type 2-A had no permanent magnet, but was energized from a local winding.

RESONATORS. (Information only) These items are grouped here for convenience. Each item must be ordered separately, and is listed separately. Resonator 3-A, now obsolete, can be converted to 7-A by addition of one Resonator Extension Arm . Resonator 5-B is used on desks, etc. where portability is desired. Resonator 6-B is used on tables having flat belt equipment. Resonator 7-B is used on non-belt or V-belt tables.

Arm, Resonator Extension. An iron arm similar to center arm of 7-B resonator. L--10". Ht--2 3/4".

Block, connecting, 7-B. Used to terminate resonator cord on duplex positions. Composition base with three 3 pairs of screw type posts and a metal "snap" cover. L--2 1/8", W--1", Ht--7/8".

Bolt, Sounder, 2-A. A #8-32 x1 ½" R.H.I. machine screw, with thumb nut and washer used to fasten sounder into hood.

Cord, Resonator. [Pieces or feet] Piece of standard #18 ga. twisted pair black lamp cord used to connect sounder in resonator to instrument on table. If ordered by "pieces" comes in 5 ft. lengths ready to use.

Hood, Resonator. Used as sounding board for one or two sounders. Triangular wooden box of triangular vertical cross section with one side open. W--7", Ht--7 1/4", D--5".

Resonator, 5-B stand only. Iron stand similar to telephone desk stand with flat plate for mounting resonator on. Ht--8", Dia. base--5 1/4".

Resonator, 6-B, frame only. A triangular bracket for attachment to conveyor structure, two additional swivel arms, and a swivel plate for bottom of hood.

Resonator, 7-A, frame only. A triangular base with shaft at top for first swivel arm, three arms, and a swivel plate for hood. Shipping size 12" x 7" x 3".

Resonator, 5-B, stand only. Used where portability of resonator is desired. See description above.

Resonator, 6-B, frame only. Used on flat belt type structures. See description above.

Resonator, 7-B, frame only. Used on various Morse tables. See description above.

RHEOSTAT, RADIAL ARM, #17. An older type of rheostat no longer furnished. These are much like #1 type but had one less single dial. Some #17 rheostats have wood, others steel cases. Some had no front plate, the binding posts being on top, others had binding posts on front. All those having a front plate are convertible to 1-BB type.

RHEOSTAT, RADIAL ARM, 1-C.* Used on duplexed circuits of all kinds for providing resistance in artificial line. Sheet metal box with top and one half of front of composition. Top has one double and 3 single dial switches and front face has one single switch and 5 binding posts. Type 4-A resistances connected to dials give 250 and 2500, 8250, 1000, 125 and 600 ohms resistance with intermediate taps on all. W--6 ½", Ht--8 1/4", D--7 ½".

*1-A type did not have "zero" stud on 600 ohm dial and some have wood case. 1-B type is almost similar to 1-C. 1-BB type is made from an older rheostat #17 type, which see. All three are interchangeable in use.

RHEOSTAT, 16-A. Used to control bias current on telegraph sets having polar relays in operation on single current circuits. Rectangular metal case with single 12-step dial on top and 12 type 1-A resistances to give 250 ohm steps up to 9000 ohms. W--4 3/4", Ht--6 ½", D--3 1/4".

SELECTOR, GILL, MODEL...., CODE....* [Form 2968] Installation of additional selectors, except on such sets as specifications provide them, must be approved by Vice Pres. Traffic before reqn. is written and the approval noted on the reqn. Reqns. for maintenance purposes must be approved by the head of department in charge of the maintenance. Used to close a local circuit by transmission of a predetermined set of direct current impulses over a line. An electromagnet whose armature drives a gear train in such a way that if its predetermined code is received, the train closes a contact, but if any other impulses are received, the contact gear drops out of step. Mechanism is set on a porcelain base and covered with a glass case. L--6", W--4", Ht--4"".

	Resistance		**Current**	
Model	Series	Parallel	Series	Parallel
D	8		100	
F	100	25	40	90

* If needed for a new office having no code assigned state "Code unassigned" and also whether for W. U. or railroad office.

SET, ADAPTER, 1-A. [One set cares for two repeaters.] Used to convert 25 and 52 volt duplex half repeaters into full duplex sets. Box with wood sides and metal front and back containing one WE 44-D retardation coil. The two parts of this coil are wired to 2-37-A call circuit switches mounted on one end of the box. 14 binding posts on rear/L--11", W--2 3/4", D--10 3/4".

SET, MORSE, PORTABLE, 1-A. Used at sports events, etc., when a KOB set must be used out in the open in any kind of weather. A sheet metal box with hinged door at each end and a 15-B 120 ohm sounder and a 2-A legless key mounted in bottom. Key button is reached by opening door on one end. If semi-automatic key is to be used, set is turned upside down, door at opposite end is opened and "bug" is set on bottom and wedge placed in small jack on side. One door is hinged at top and one at bottom, both having side hoods to keep out rain. L--9 ½", W--6 1/8", Ht--8 ½".

SET, TELEGRAPH REPEATER, 2-A, ... OHMS.* Used on duplex half repeater sets for obtaining polar operation of main line with single Morse operation of drops. Two separate relay structures mounted on a wood base with iron subbase. One relay (left hand) acts as polechanger to send single Morse into duplex side, while other (right hand) is operated by polar line relay to send into single Morse side, and is termed the control relay. Furnished in 32 ohm (for 26 and 52 volts) and 150 ohm (for 80, 110, 160 volts) this being the resistance of the control relay with coils in series. L--12 3/8", W--5 3/8", Ht--5 ½".

* When changing local circuit voltage, complete new sets should be ordered.

SOUNDER, AUTO SWITCH. See Repeating Sounder 3-A

SOUNDER, KOB, 16-AC or 16-C. A main line sounder without its wood base, set directly on a 9" x 6" by ½" wood base together with a legless key. Sounder has mechanism of 15-AC or 15-C types, which see. Used only for miscellaneous portable services. See #15 and #17 sounders and portable Morse Sets for latest data.

SOUNDER,..., ... - OHM. Ordinary telegraph sounder for use on local circuits. Electromagnet with armature set on a pivoted sounding bar. Bar plays between two legs of U-shaped anvil, stop screws being provided for adjustments. Mechanism is set on wood base. Type 1-B has coils brought out separately to binding posts for either series or parallel connection.

Type	Resistance	Current	L	W	Ht
1-A	4	250	5 ½"	3"	3 ½"
	50	110	same		
1-B	400 (series)	30	"		
	100 (parallel)	60	"		

SOUNDER, MAIN LINE, 15-B, ... OHM.* Use on single Morse circuits for operation directly in main line instead of a local circuit. Generally similar to common sounder but of larger size. Coils are moveable horizontally so as to vary air gap between pole pieces and armature, thus compensating for varying line current. Furnished in 30 and 120 ohms, requiring 70 and 40 mils respec. L--5 ½", W--3", Ht--4".

*15-A type now obsolete had adjustment screw on top of armature, this being only adjustment feature. Resistance 150 ohms.

SOUNDER, MAIN LINE, 15-C OR 15-AC. An older type of sounder now used only in KOB service. Air gap is varied by moving sounding bar trunnion up or down in arch, and spring tension is varied by thumb screw mounted in small brass box. 15-AC is 150 ohms (many of these are marked 15-A, but are of 15-C mechanical design) 15-C made in 25 and 100 resistance, current 70 and 40 mils respec.

SOUNDER, MAIN LINE, 17-A. Used interchangeable with 15-B sounder. Adjustment of air gap is done by moving coils vertically from a thumb screw at one end.

SOUNDER, REPEATING, ..., ... OHM. Used in local circuits where it is desired to repeat the signal into another circuit. Similar in size and general design to #1 sounder, but has contact screws on anvil end of sounding bar. #2 type makes on down stroke while #3 not only makes on down stroke but opens another circuit at same time.

Type	Resistance	Current	Specn.
2-A	4	250	E-178-D
	50	110	E-178-D
2-B	400 (series)	30	767-B
	100 (parallel)	60	767-B
3-A	same as 2-B		1597-A

SOUNDER, SECRET, #.... Used where it is desired that operator only shall hear signals. Miniature sounder set in watch case receiver on head band. Cord included.

Type	Resistance	Current
6230	5	500
6231	20	250
6232	150	50

STICK, LISTENING, WE 94364. Used by testing and regulating forces to transmit instrument sounds directly to the ear. Mahogany rod ½" by 18" with flat ear piece at one end.

STOPPER, SOUNDER, 1-A. Used to stifle sounders on repeater tables or elsewhere when signals are not being read. Piece of spring bronze with projecting ears. Is mounted under sounder back stop screw and end can be swung over front screw to hold sounding bar down. Max dimension 1".

SWITCHBOARD, CABINET TYPE. A general name give to pin jack telegraph switchboards to which the equipment is assembled into a metal box or cabinet. This cabinet may be attached to the wall or be self-supporting on the floor. See also single and double circuit switchboards.

WHEEL, CODE, 1-B, #.... [Form 2968] Used in call boxes for furnishing signal impulses. Two toothed brass discs mounted rigidly together. Movement of box gears cause pins of call box to engage tops of teeth as code wheel revolves. Wheels are coded to order in the following numbers, all inclusive. Numbers 512 and up shall be used only when lower ones cannot be used.

21 to 25
31 to 35
41 to 45
51 to 55
121 to 125
131 to 135
141 to 145
151 to 155
212 to 215
221 to 225
231 to 235
241 to 245
251 to 255
312 to 315
321 to 315
331 to 335
341 to 345
351 to 354
412 to 415
421 to 425
431 to 435
441 to 444
441 to 453
512 to 515
521 to 525
531 to 534
541 to 543
551 to 552
612 to 615
621 to 624
631 to 633
641 to 642
651

ZINC, CROWFOOT. For gravity Battery. Crowfoot shaped zinc casting. Center of foot having pedestal with brass thumbscrew binding post an hook for hanging from top of jar. Diameter 5 ½" ht 3 ½ " wt 3 1/8 lbs.

+++

As you can see, this was quite an effort. We plan to provide additional information from this catalog in the future, but this issue contains most of the telegraph items. If you have any Western Union gear that you want the specifications on, please drop me a note, and I will include it in a future Keyletter if the information is available.

SPARK PROJECT UPDATE. I just received a large packet with photos from a major European telegraph key collector and will therefore be adding several photos to the Spark Project page over the weekend. Interestingly, in the letter he has first hand proof that the Marconi International Marine 365A was in fact used with quenched gap spark rigs. He himself sailed on ships using the 365A on spark, and he corroborates this with the experience of another well known European collector. This information is directly in conflict with the beliefs of several collectors in know in the U.S. I had not mentioned the 365A in the Spark Project page before, but I believe that it's hard to disregard two first hand reports of this nature. This simply may have been such a versatile, hardy key that was so familiar to so many shipboard operators that it was used wherever they wanted to use it regardless of the original intent of the manufacturer. It will be included on the page, with explanations of its original design and likely subsequent use on spark transmitters.

I will be adding a picture of the smaller of the S.G. Brown (London) keys-- which has a mica disc through which to watch the spark! I'll also be adding a picture of the Marconi (London) Type 100 spark key, and pix of Admiralty Pattern Key variations. This rather large packet of photos has many unknown spark keys in it which represent a challenge now for me to try to come up with a manufacturer. One of these is a key with the contacts "shrouded" in brass sleeves-- doesn't look like an oil break, but similar. There is a British key in the packet that looks a lot like the General Radio CAG spark relay/key combo. These can all be seen at: http://www.zianet.com/sparks/index.html under “Spark Key Project”. (*Russ Kleinman*)

Richard Loveland. I may be the only ham who does so, but I distinguish between reading and copying. I have read that some hams never learn to read without copying. On the railroad much--and at the test board or at a repeater table almost all--communication was of an informal conversational sort. There were plenty of abbreviations – we used to call it "boxcar code". It was as rare to write down such conversational communication as it would be for my auto mechanic to take down my every word while chatting about a recent football game. Of course if a mailing address, phone number, part number or something like that came up, he might write it down. Messages, train orders, consists (description of what a train consisted of) were copied from the wire, as were reports involving a printed form to be filled out. A telegrapher might make a note of the time of departure of a train coming his way, and discard it after the train had passed.

I've seen operators copy with a pencil or a mill. I've seen telegrams that had been copied in ink. But I never saw or heard of anyone who COPIED by EAR. He may have read by ear, but not copied. The concept or Morse as an artificial language seemed quite common among the early telegraphers. In the Bunnell students' manual of 1884 the author writes of learning to read and write Morse.

Many people today apparently confuse hearing with copying. I think the phone hams, CBers and other two-way radio users in an attempt to be "salty" adopted the telegraphers' term "copy" as a substitute for "hear", "get" or "understand". If one of them asked me if I had copied something, I would be tempted to ask "Did you write anything?" Of course there were jobs that required a telegrapher to copy almost everything. The press, broker, or horse room operator seldom sent anything or even answered the wire. There was one sender at the main office and receivers were distributed in various cities. They were expected to be on the job and take what was sent without being called or addressed. I heard of one job where the operator didn't even know where the key was. When his boss came in one day with a question to be transmitted, the telegrapher had to hunt around until he found a key mounted up on the wall. I guess they didn't want him to break.

That reminds me of Jack Burns who was working relief for the Troy Union in the early 1950s. He had formerly been with the New York Central when they had a practice of sending consists from one yard to several other stations simultaneously. The sender was not the clearest of senders and sometimes his combinations were really unreadable, and Jack would break and get the needed fills. One time when meeting face to face with some of his co-receivers he asked, "Why am I the only one who has to break?" One answered, "Why should I break? I know you will." Jack used to say that a good sender needed C-N-L and J-G-M. Phillips code for "Control and judgement".

MORSECODE BITS & PIECES

Naval Jelly. John Kendra requested information on how to handle rust pitting on a Mac Key without removing the black crinkle paint. Tony Rogozinski suggested “Naval Jelly”, and John reported that it worked well - the secret is several thin coats. For the information of our non-North American subscribers, Naval Jelly is a commercial product that neutralizes rust. (*N7CFO*)

Lowenstein. Fritz Lowenstein was an Austrian immigrant. In 1899 Lowenstein and Nicola Tesla designed a 60KW spark transmitter and in 1902 joined in the construction of a 300KW transmitter on Long Island. By 1910, Lowenstein's many innovations in wireless technology brought him to the attention of the U.S. Navy who encouraged him to engage in the manufacture of wireless gear for the Navy. In 1912 a transmitter of his making was being tested in the Brooklyn Navy Yard for acceptance. The transmitter included Lowenstein's own innovations, the 'wave changer', and a tubular quenched gap. Lowenstein is also credited with the invention of the "C" battery circuit. At the start of WWI he was president of the IRE (now IEEE). I found this information in the biographical notes of Joseph P. Danko, who knew and worked for Lowenstein. (*Neal McEwen*)

WW2 Vibroplexes. A WW2 Deluxe Vibroplex is a Deluxe Vibroplex made during WW2 that has "battleship gray" crackle paint on the base instead of chrome plating. The other features of a Deluxe are the same as any other Deluxe Vibroplex, namely red knobs and paddle, jeweled bearings, and a small copper braid running from the frame to the lever. Serial numbers are in the range from 125,000 to 140,000 (roughly). Vibroplex made a lot of keys during the war, and WW2 Deluxe Originals are not hard to find. WW2 Deluxe Lightning Bugs are hard to find but not really scarce, and WW2 Deluxe Blue Racers are scarce. During WW2 Vibroplex used thinly plated steel nameplates instead of brass nameplates on both Standard and Deluxe versions. Images of WW2 Deluxe Vibroplexes can be seen on my Web site at "http://www.la.ca.us/frandy/". (*Randy Cole*)

Smokestack Key Knobs. In Keyletter 29, Russ comments about these handles being associated with the use of the key in an airplane. This may be the reason although I have seen several of these keys in early photos in home station situations. So it just may be the early German style. Note also the early Grasshoppers which I believe were English with this type of knob. (*Pete Malvasi*)

Australian J-36. Some of you will remember that I won an Australian made J-36 on eBay about 2 months ago. There are several remarkable things about this bug. First, it is the only Australian made J-36 I have ever seen or heard of, and is not listed in Paul Bock's article of a couple of years ago in The Vail Correspondent. Second, the hardware, label placing and type all are identical to the Buzza Products bug that I have. The label on the J-36 does not mention the manufacturer's name; it only says "J-36 Automatic Key, Signal Corp. U.S.A., Made in Australia". But I will place money on it having been made by Buzza Products. I note that it is not mentioned in the recent Keyletter article on Buzza Products. It needs to be added to the list of pieces made by that company! (*Russ Kleinman*)

Wallace/Clapp-Eastham. While musing over the pix on the spark list, I came to a rather interesting conclusion: the Wallace key #4281 ad and the Clapp-Eastham Blitzen key ad use the exact same picture!! One of them, or possibly both of them (!), just marketed the key! My guess is that the key was made by Clapp-Eastham and Wallace only marketed, since we know that C-E made a Boston Key on a composition base. (*Russ Kleinman*)

Ceramit paint. I found a ceramic based two part paint that duplicates Vibroplex's japanning. I've done a couple of bases with it and in side to side comparisons it's hard to tell the difference. The paint is heat cured and instead of using a kiln you can use a toaster oven. It goes by the name of Ceramit and is a product of Hammel, Riglander & Co Inc, Carlstadt, NJ 07072. In my area it is sold by Gaber and Co, 1501 Reedsdale St, Pittsburgh, PA 15233, Phone 1-800-792-2820. (*Tim Soxman*)

Well, that is it for # 30. Please keep those cards, letters, and e-mails coming. As always, material suitable for publication is appreciated!

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